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## **Document 61**

# **Rebuttal Expert Report of Konrad J. Banaszak**

**IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF ILLINOIS,  
WESTERN DIVISION**

LAJIM, LLC, an Illinois Limited Liability )  
Corporation, Prairie Ridge Golf Course, )  
LLC, an Illinois Limited Liability Company, )  
Lowell Beggs, and )  
Martha Kai Conway, )

Plaintiffs, )

v. )

General Electric Company, a New York )  
Corporation, )

Defendant. )

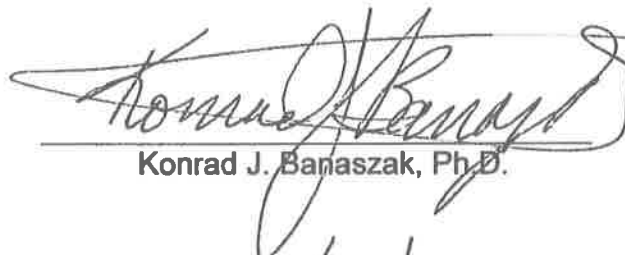
Case No. 13-cv-50348

Senior Judge Philip Reinhard  
Magistrate Judge Iain D. Johnson

**REBUTTAL EXPERT REPORT**

**OF**

**KONRAD J. BANASZAK, PH.D.**

  
Konrad J. Banaszak, Ph.D.

2/12/15  
Date



**GENESIS ENGINEERING & REDEVELOPMENT**

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I have reviewed the Expert Report of Peter Vagt, Ph.D. of MWH Americas, Inc. (dated January 2015) and the Expert Report of Nadine Weinberg of ARCADIS U.S., Inc. (dated January 13, 2015). I have organized my rebuttal around the four opinions in my Expert Report (dated November 13, 2014). Each of my four principal opinions is restated below followed by my rebuttal.

**Opinion No. 1**

**Following the discovery of contamination in the City of Morrison, the environmental response work performed by GE and its environmental consultants did not conform to standard practice in the environmental industry. GE and its environmental consultants neglected for years to characterize sources, perform a reliable well survey, and define the extent of groundwater contamination.**

Dr. Vagt did not directly discuss or address the issue I raised about the work done by GE and its environmental consultants failing to meet standard practice of the environmental industry. I had addressed three specific issues.

First, GE and its environmental consultants failed to characterize the source. This is established by the fact that no effort was made to complete soil borings at the locations of the degreasers until 28 years after contamination was discovered in the City of Morrison. The soil boring work that MWH performed in 2012 was still not done to standard practice. The soil borings were completed with a Geoprobe rig instead of a drilling rig, and so there was refusal at the bedrock which is at a relatively shallow depth. The failure to use a drilling rig, and the decision to use an inadequate Geoprobe, resulted in a failure to adequately characterize the extent of contamination at the source even now, as there still have been no observations or measurements of contamination in the bedrock beneath the degreasers.

In discussing the difficulties presented by DNAPLs, Dr. Vagt states

It has been acknowledged by the regulatory agencies that finding direct evidence of DNAPL is highly unlikely in fractured bedrock settings even when groundwater sampling suggests that DNAPLs exist. As a response to this challenge, USEPA had developed the Technical Impracticability Guidance (USEPA 1993) to direct alternative decision making for site characterization and site remediation where the evidence of DNAPL is suspected. (See p. 3-12, Section 3.4. of Dr. Vagt's Expert Report.)

However, the Technical Impracticability Guidance states in bold print its purpose,

This document outlines EPA's approach to evaluating the technical impracticability of attaining required ground-water cleanup levels and establishing alternative, protective remedial strategies where restoration is determined to be technically impracticable. (See p. 1 of USEPA, 1993.)

Further into the guidance, commenting on site investigations, the guidance states:

[L]ocating DNAPLs in certain geologic environments may be impracticable. EPA expects, however, that all reasonable efforts will be made to identify the location of source areas through historical information searches and site characterization efforts. (See p. 13 of USEPA, 1993)

(See second bullet on p. 3-13 of Dr. Vagt's Expert Report where the first sentence is quoted, but not the second sentence.) A more powerful drill rig rather than a Geoprobe at the locations of the degreasers is a reasonable site characterization effort.

Second, GE and its environmental consultants failed to do a reliable well survey for over 20 years, as shown by the fact that people drank water from a well containing TCE at concentrations well above the Maximum Contaminant Level (MCL). Dr. Vagt did not comment on or deny this significant failure to conform to standard practice.

Third, GE and its environmental consultants failed to define the extent of contamination horizontally or vertically. There is no plume map in Dr. Vagt's Report showing the lateral extent of contamination in any geologic layer. In the carbonate bedrock above the Maquoketa Shale, an insufficient number wells exists to make a reliable plume map.

Furthermore, the entire situation at the GE plant and in the City of Morrison came to light because of contamination found below the Maquoketa Shale in Morrison's City Well 3. City Wells 1, 2, and 3 tap hundreds of feet of rock below the Maquoketa Shale. At least one route for the contamination to get below the Maquoketa was for contaminated groundwater to pass through holes in the casing and then down City Well 1. City Well 1 was cemented in 1988, and City Well 2 was also cemented. The evidence from influent to the air stripper on City Well Number 3 showed detectable cis-1,2-DCE through October of 2007 and TCE through 2006. Available information from the City of Morrison shows detectable TCE and cis-1,2-DCE in the water supply in 2009. (See City of Morrison, 2012). The most probable explanation for these findings is that some groundwater below the Maquoketa Shale is still contaminated.

### **Opinion No. 2**

**From the time of discovery of the contamination until now, the environmental response work done by GE and its environmental consultants to assess the groundwater contamination issues at and downgradient from the Morrison Plant has been flawed, inadequate, and incomplete. GE and its environmental consultants have erroneously presented the groundwater flow system and the groundwater chemistry.**

Dr. Vagt carries forward the issue of flawed hydrogeologic interpretations contained in MWH's Facility Site Investigation (FSI) report and subsequent reports and

communications with the IEPA. Dr. Vagt displays groundwater flow in a flawed manner not consistent with the data or even with his own interpretations. Dr. Vagt also seems to imply that the hydrogeological conditions of 2012-2014 are those of the past 28 years. Dr. Vagt does not properly describe the groundwater chemistry. Specific issues are discussed below.

1. Dr. Vagt's Exhibit F is contoured incorrectly. The elevation of the pond south of Rock Creek is measured at 620.89 feet. (Note the green triangle on Exhibit F.) However, on Exhibit F, there is a 623 foot contour passing almost directly through the observation point, and there are other contours higher than 621 passing through the pond. Correct contouring would be quite different from that on Exhibit F.

2. Dr. Vagt's Exhibit I disagrees with known information. The cross section does not show the existence of the pond south of Rock Creek that is certainly there and is shown in Exhibit F. Exhibit K also disagrees with known information. The south supply well is in the wrong location, and accordingly at the wrong elevation.

3. Putting Dr. Vagt's Exhibits I and K together, the attached Figure 1, shows that Dr. Vagt has presented two different ideas with respect to groundwater flow. Exhibit I corresponds to all the mathematical analyses by Dr. Vagt, but the direction of the hydraulic gradient conflicts with the major direction of groundwater flow shown on Exhibit K. Dr. Vagt states that on his Section B-B', "Arrows have been added to show the directions of the gradients that drive groundwater flow on the north and south sides of Rock Creek and groundwater flow below the creek," (See p. 4-4, Section 4.1.2 of Dr. Vagt's Expert Report) and "it is the gradients, not the stratigraphy that drive groundwater migration (See p. 5-5 of Dr. Vagt's Expert Report, second paragraph under Part B)." Yet Dr. Vagt's own Exhibit K clearly shows stratigraphy is more important, as the main flow is down the upper bedrock zone. Flow like that shown on Exhibit K, not like that shown in Exhibit I, would allow contamination to reach the deep gravel and the broken up bedrock which is tapped by monitoring wells MW7-LS and MW8-LS, both adjacent to Rock Creek.

According to the flow postulated in Dr. Vagt's opinion based upon Exhibit I, all of the water flowing into layers 3 and 4 and the water flowing in the clay portion of layer 1 of Exhibit K must come from Dr. Vagt's layer 4 under the GE facility to the point where the top of the clay portion of layer 1 intersects the top of layer 4. These observations make the calculations (presented later in Dr. Vagt's opinion) of amounts groundwater moving in various zones to Rock Creek dubious at best.

4. Dr. Vagt's method of base flow separation and his conclusion that 75 cubic feet per second (cfs) flow in Rock Creek is baseflow (See third paragraph on p. 4-7, Section 4.2 of Dr. Vagt's Expert Report.) was not done by any stated method (other than picking the median flow) and is not, in my experience, a recognized method. (See reference USGS, 2015, Methods for Determining Base Flow in the reference list.) Furthermore, Dr. Vagt's analysis of the time of flow in Rock Creek that was above 75 cubic feet per second (See final three paragraphs on p. 4-15, Section 4.4 of Dr. Vagt's

Expert Report.) is demonstrably wrong by looking at Dr. Vagt's own daily discharge graphs and tables.

5. Dr. Vagt suggests that looking for 1,4-Dioxane would be of little or no value because it would be contained in the plume of the chlorinated solvent compounds. This conclusion cannot be reconciled with the facts that 1,4-Dioxane travels roughly at the speed of groundwater, while chlorinated solvents are retarded with respect to groundwater flow velocity. Also, Dr. Vagt has apparently ignored the known toxicity of 1,4-Dioxane (See last paragraph on p. 3-5 and first paragraph on p. 3-6, Section 3.1.4 of Dr. Vagt's Expert Report). If it were discovered in the groundwater, this compound presents a risk to human health. The necessary information for mobility and toxicity may be gleaned from the EPA Fact Sheets for 1,4-Dioxane, TCA, and TCE are given in the references.

6. Even with all of the variances in groundwater flow noted above, Dr. Vagt still describes some contamination either stagnating under Rock Creek or actually moving as if in a tube below Rock Creek in the same direction as flow in Rock Creek. These ideas (that is, a stagnation zone, or a tube of highly contaminated groundwater at depth) are not compatible with each other. Additionally, the flow properties need to be known and understood for the selection of remedial methods.

7. Contamination in the deep carbonate bedrock (above the Maquoketa Shale but below the weathered carbonate bedrock) is not explained by Dr. Vagt. Such contamination could be easily explained if there is a DNAPL source.

8. Dr. Vagt's explanation of the finding of TCE in the south supply well is generic and is based in part on pumping at the south supply well. The cross Section A-A' from my expert report, while not represented to be directly on a flow line, shows that both the north and south supply wells tap the carbonate bedrock lower than the bottom of Rock Creek Valley fill, and that the hydrogeologic setting near the south supply well is unlike that in the area focused upon by Dr. Vagt between his two cross sections roughly perpendicular to Rock Creek. The biggest issue is whether groundwater flow in the competent bedrock may be modeled or even thought of as a porous medium or whether fracture flow is the reality. Dr. Vagt suggests that fractures are important when discussing DNAPLs. The more likely understanding is that the flow in the lower carbonate units is fracture flow. (See references to USGS studies in rocks of the same age in the references in my initial report.) Fracture flow operates with significantly different characteristics than those of intergranular flow in sand and silt.

9. The cross sections included in my expert report were prepared to show the strongly variable hydrogeological conditions, especially with respect to Rock Creek. Cross section A-A' was done to show the conditions nearest to south supply well and traversing Rock Creek between the stream flow measurement locations SG-1 and SG-2 reported by GeoTrans. Cross section B-B' traverses Rock Creek between GeoTrans' stream flow measurement locations SG-2 and SG-3, and is where the highest levels of groundwater contamination has been observed. Cross sections C-C' and D-D' were

done to show Rock Creek through the historically contaminated City Wells, which is the location where contamination was first found in the City of Morrison. Cross section E-E' was done to be close to the outfall of the Morrison Sewage Treatment Plant (STP). Cross section F-F' was done to show the conditions, which are different than any of the other sections, at the USGS surface water gage, the gage relied upon by Dr. Vagt to characterize the base flow and overall discharge of Rock Creek.

10. Finally, Dr. Vagt states that natural attenuation is an important mechanism for the diminution of chlorinated solvent contamination of groundwater. While some degradation is indicated by the chemistry, 28 years of data have certainly shown that natural attenuation alone is not sufficient to deal with groundwater contamination to the south of the GE plant.

### **Opinion No. 3**

**The work done by GE and its environmental consultant ARCADIS for the vapor intrusion issues in the area near the GE Plant is insufficient to conclude that residents in the homes south of the plant, and occupants and users of buildings in the affected area such as the golf course clubhouse, are not at risk. Additional vapor intrusion investigation and monitoring work should be performed.**

Ms. Weinberg stated that shallow groundwater does not have sufficient 1,2-DCA to generate the values found at the non-responsive residence and emphasized that 1,2-DCA was not detected in soil gas samples collected from beneath that residence. Yet there are findings of 1,2-DCA in shallow groundwater and in other media at the GE site and its immediate proximity. Ms. Weinberg posits that the 1,2-DCA found in the non-responsive residence is from a source within the home. Proof of that postulate could be established by the identification of actual potential sources in the home and measurement of air immediately next to the purported sources in the home, but that has not been done. GE installed vapor mitigation system in nearby residential property at non-responsive, which GE and ARCADIS described as a "precautionary measure." Ms. Weinberg still concludes that there is no need for further investigation. However, the science of vapor intrusion is in a state of flux even with respect to basic measurement and risk assessment. The nature and extent of contamination south of the GE plant is not fully defined. Under the circumstances, now is not the time to declare GE's vapor intrusion work at non-responsive complete. Now is not the time to conclude that GE is not the cause of the 1,2-DCA contamination, and now is not the time to stop testing vapor intrusion testing and monitoring.

### **Opinion No. 4**

**The work done to date by GE and its environmental consultants is not sufficient to make a proper final remedial determination for the Prairie Ridge Golf Course. However, what is clear is that natural attenuation has not worked and is not an appropriate remedy. Source control at the GE Plant and active remediation under the golf course will be needed. More investigation work is necessary.**



Dr. Vagt expresses the idea that MWH is now ready, with the final say given to the IEPA, to pick the remediation strategy. Yet, GE and MWH have already presented the putative favorite in the FSI, natural attenuation. The evidence from 28 years of observation clearly cries out that natural attenuation cannot be the only or principal method relied upon.

Dr. Vagt states that evidence of a DNAPL probably cannot be found in fractured rock. I disagree and counter that efforts using the correct drilling methods haven't even been tried. The lack of knowledge of whether a DNAPL exists, and especially its size, means that a scientific and engineering basis does not exist for understanding the types of remediation to consider, the costs of remediation, and the time required for remediation. Without such basic information, there is no basis to rank the cost effective alternatives. Beyond the DNAPL issue, the lateral and vertical extent of contamination is still not clearly defined. Without the basic parameters defined by a complete investigation - the areal extent of contamination, the vertical extent of contamination, the amount of contamination within the plume, the precise source or sources of contamination to the plume - it is difficult, if not impossible, to make final and realistic scientific, engineering, and economic decisions about the remediation of the GE contamination at the plant, in the residential neighborhood, under the golf course, and in and around the City of Morrison.

The source characterization work should be completed, and remedial steps should be taken without delay to treat contamination at the source and prevent contamination from migrating from the GE plant property to the properties to the south.

### **REFERENCES**

References from my Expert Report, dated November 13, 2014, as well as the references contained in Dr. Vagt's and Ms. Weinberg's Expert Reports, are incorporated herein.

City of Morrison, 2012 Water Quality Report. Available at -  
<http://www.morrisonil.org/wp-content/uploads/2014/07/2012-CCR-Report.pdf>

EPA Fact sheets for trichloroethene (trichloroethylene), 1,1,1 trichloroethane, and 1,4 dioxane may be found at the web addresses below:

<http://www.epa.gov/ogwdw/pdfs/factsheets/voc/tech/trichlor.pdf>

<http://www.epa.gov/ogwdw/pdfs/factsheets/voc/tech/111-tric.pdf>

[http://www2.epa.gov/sites/production/files/2014-03/documents/ffrro\\_factsheet\\_contaminant\\_14-dioxane\\_january2014\\_final.pdf](http://www2.epa.gov/sites/production/files/2014-03/documents/ffrro_factsheet_contaminant_14-dioxane_january2014_final.pdf)

Expert Report of Peter Vagt, Ph.D., MWH Americas, Inc., dated January 2015.

Expert Report of Nadine Weinberg, ARCADIS U.S., Inc., dated January 13, 2015

USGS, 2015, Toolbox for base flow separation of streams. (While the date of this web addressed material is essentially coincident with Dr. Vagt's Expert Report, the dates of the references upon which the toolbox rests are earlier than Dr. Vagt's Expert Report.) Web addresses are below.

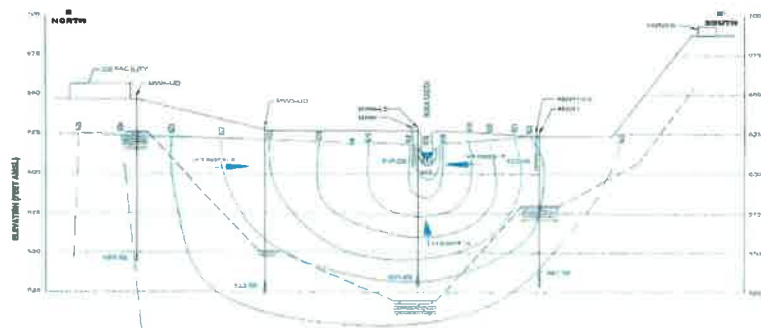
<http://pubs.usgs.gov/tm/03/b10/> is the web address of the tool box.

<http://pubs.usgs.gov/tm/03/b10/pdf/tm3-b10.pdf> is the web address of the report supporting the web tool box which contains several references which detail base flow separation techniques.

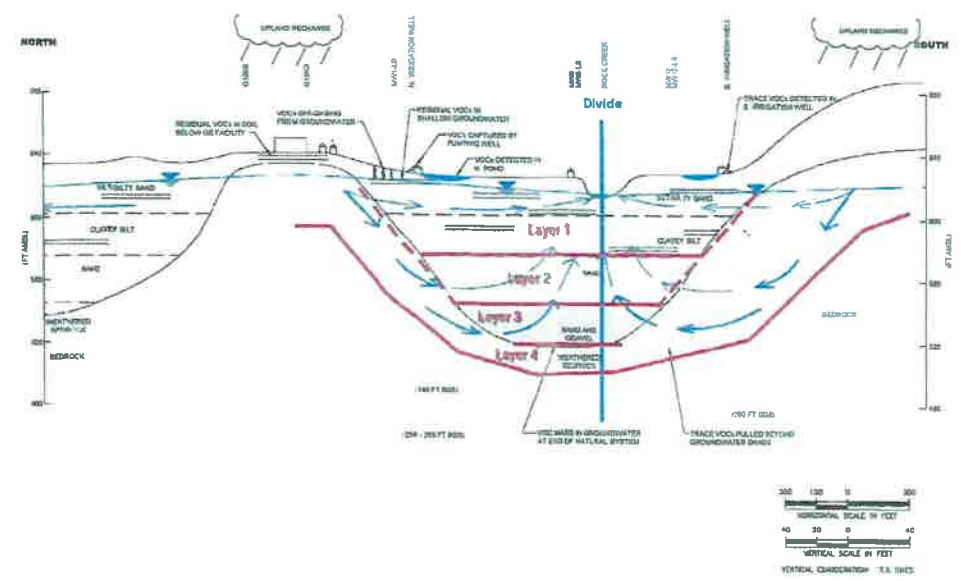
**FIGURE 1**

**Analysis of Dr. Vagt's Exhibits I and K**

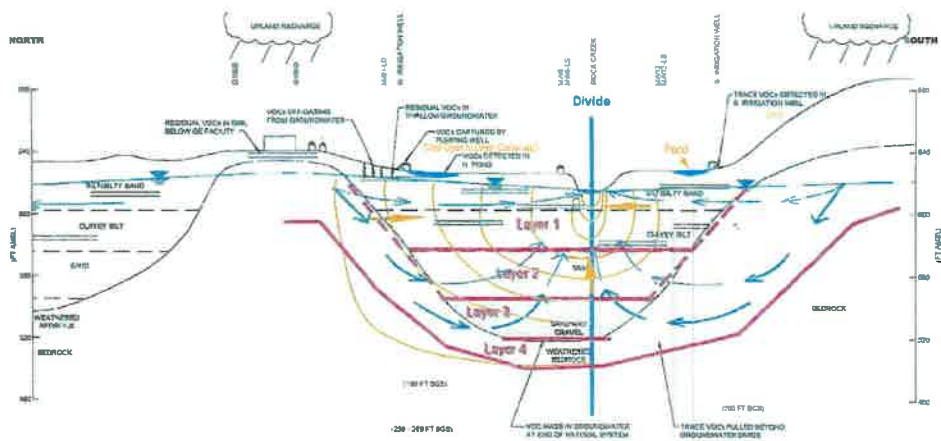
Dr. Vagt's Exhibit I. Cross Section B-B' with Potentiometric Plot  
Vertical Scale Modified to Match Exhibit K



Dr. Vagt's Exhibit K. Geologic Cross Section



Hydrogeologic Cross Section Modified from Exhibits I & K Dr. Vagt's Expert Report



**Legend:**

- Thin Discontinuous Layer of Coarser Grained Material
- Silt/Silty Sand
- Clay
- Sand
- Sand and Gravel
- Weathered Bedrock
- Bedrock
- Water Table
- Groundwater Flow Path (Primary)
- Groundwater Flow Path (Secondary)
- Weathered Bedrock (Exhibit I)
- Inferred Bedrock Surface
- Water Table
- Potentiometric Contour (Dashed Where Inferred)
- Potentiometric Groundwater Elevation
- Direction of Hydraulic Gradient
- Symbol for Hydraulic Gradient
- Additional Legend for Modified Figure**
- Equipotential Lines from Exhibit I
- Direction of Hydraulic Gradient from Exhibit I
- Words in Orange Added

**GEER**

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ANALYSIS OF DR. VAGT'S EXHIBITS I & K			
Morrison, Illinois 709 West Wall Street, Morrison, Illinois			
Designed:	KB	Project Number:	177-AA-2
Drawn:	DH	File:	177AA2_19
Checked:	KB	Revision:	xxxxx
			Figure 1 Date: 02/05/15